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THE NORTH AS A REGION

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THE NORTH AS A REGION

by

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Foreword

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The North as a Region

B.G. Sivertz,
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While the Canadian North has received increasing attention during the past 20 years, it is an area that is but poorly understood by most Canadians. Relatively few Canadians have a working knowledge of this region. Despite this, development is proceeding at a rapid rate and the identification of the average Canadian with his North is becoming more apparent.

Canadians would not willingly part with the 40 per cent of the nation's territory that lies above 60° north latitude. A few years ago the far North of Canada was little known and little valued. A great change has taken place. The change has occurred in the years since the war. It has come about because it has become possible to set up, even in the high arctic, living arrangements that afford security to life, even family life, and facilities for industrial operations. Except for summer visits of ships and barges, northern settlements had been isolated. Air traffic was unreliable and costly, and radio communications were sketchy. Life in the northland was a pioneering venture not unlike life on the western plains before railroads were built.

Speculation on what would be revealed if the ice-cap melted off Greenland notes the probability of many islands in place of the one large one. What an interesting parallel to what took place in Canada some ten thousand years ago! Many islands were revealed when the glaciers retreated; extensive areas of bare Pre-Cambrian rock, sediments laid down in tropical conditions and extending to 40,000 feet in thickness; high mountains appeared, and millions of lakes. All this in a postglacial thermal regime that has ruled out human life and activities except on the most meagre and tenuous scale, i.e., a density of one person for each 40 square miles on the average, and, north of latitude 70, only evidences of attempts at human habitation that did not continue.

The Canadian North is not one region but several regions within this vast area. It is important to distinguish between these regions if the development potential is to be understood. This paper makes these distinctions primarily on geologic and climatological differences. This is followed by an examination of the resource development potential including the human resources.

There are two ways in which people may dwell in the Canadian northland. The one is to live as did the aboriginal inhabitants. This livelihood requires the full time of the entire family. As this kind of existence must be in balance with all the other animals, the number of people who can live in that way is not only limited but is subject to fluctuation. In any case, it is another world apart from the 20th century industrial civilization of the North American continent.

The second way for people to dwell in the Canadian northland is to move north with the trappings of civilization--houses, heat, store food, clothing, furniture, water supply, medical facilities, schools, electricity, radio communications, air transportation, motor vehicles, books, music, cameras, movies, clubs, churches.

The second way has become possible in the past two decades with the advances in technological development in a number of fields. Foremost among these is the development of aircraft and the means of flying them reliably. Though this factor is termed foremost, there are many others that come together to strengthen the main factor. For example, aerial photography has become the method of surveying the country. It is difficult to say how many years might have elapsed before the topography was recorded with any approach to the accuracy and completeness required for safe air travel. Islands before unknown were revealed during the photographic surveys of the 1940's. One of these is 400 square miles. The map

revisions amended coastlines, located lakes, rivers, mountains and established correct latitude and longitude for the entire country. For the first time the prerequisite for an inventory of the northland came into existence, namely maps. Previously, we had not known what was there, let alone how to find our way around. Another factor facilitating air transportation in the North was the improved instruments developed during and since the war. The greater reliability of very many items of equipment makes the business of northern flying different in a way that adds up to new and acceptable levels of safety and reliability.

Technological advances sometimes come in the form of a breakthrough that places a new tool in the hands of man. More often they come in the form of refinements to known procedures. Advances so made are not less important--in fact they offer the continuing prospect of improvements that are tantamount to invention of new principles.

Regions of the Canadian North

Canada's northland cannot be treated as a single region for any purpose at all. Map 1, showing the geophysical outline, distinguishes:

- (a) the Cordilleran region of the southern Yukon;
- (b) the northward extension of the central sedimentary lands of the continent;
- (c) the Pre-Cambrian shield;
- (d) the Eastern Arctic mountainous islands and the islands of the high Arctic.

These regions are differentiated primarily on geologic bases. However, the climatological differences are also considerable. The only common feature is cold winters. Map 2, on isotherms, and Map 3, on precipitation, emphasize the wetness of the Pacific slopes, the dryness of the polar ocean littoral, the continental climate of the central region and the relative moderation of the temperature in the lands adjacent to seas, even where they are mostly frozen seas. Map 4, describing ice distribution in August, permits inferences concerning the effect of sea ice on climate, and shows accessibility of northern lands to ships.

Map 5, showing the accessibility of northern regions, is the one which gives the decisive factor in dividing off the northland into five regions:

- (1) the Yukon;
- (2) the Mackenzie valley;
- (3) the Keewatin Pre-Cambrian plain;
- (4) the eastern Arctic;
- (5) the high Arctic islands.

This paper deals with these regions from this point on under the following headings, namely:

- A. Economic base in non-renewable resources;
- B. Agriculture;

- C. Forest potential;
- D. Recreational potential;
- E. Fish and Game;
- F. Small industries in the North;
- G. Northern residents--the human factor.

A--Economic Base in non-Renewable Resources

Mineral Resources

The Yukon and Northwest Territories cover one and a half million square miles, over 40 per cent of Canada. Over 700,000 square miles are underlain by Pre-Cambrian rock formation and over 600,000 square miles by sedimentary rocks. In addition, in the Yukon there are large areas underlain by the western Cordilleran formation.

Both the Pre-Cambrian and the Cordilleran areas contain zones favorable for the occurrences of hard rock minerals and the sedimentary areas are favorable for deposition of oil and gas. The Pre-Cambrian area is three times as large as that of Ontario where minerals valued at \$1 billion were produced in 1960. On the average in such large areas there is every reason to expect comparable values in ore bodies in comparable areas. The sedimentary areas are considerably larger than those of Alberta.

Development of the mineral resources of the Territories is still in the pioneering stage and the vast majority of favorable areas are as yet unexplored. Four mines are operating in the Northwest Territories, three producing gold and silver and one producing nickel and copper. The total mineral production of 1960 was valued at \$22,683,098. This figure includes over \$5 million worth of pitchblende from a mine which has since closed down.

In the Yukon, a wide range of minerals have been discovered but few large ore bodies have been found to date. There is one lead-zinc mine in production and one major placer gold operation. In addition, there are several small placer operations. Total production for 1960 was valued at \$12,179,852.

The main reason for the relatively slow rate of development is the high cost of operating in an area where transportation is most difficult and the climate extreme. This same factor has also restricted basic exploration. In addition, preliminary detailed geological surveys are insufficient and often costly preliminary programs must be undertaken to eliminate barren areas from detailed exploration. To offset these difficulties, the government has decided to underwrite the basic transportation costs of prospecting parties in return for geological information on the areas under exploration.

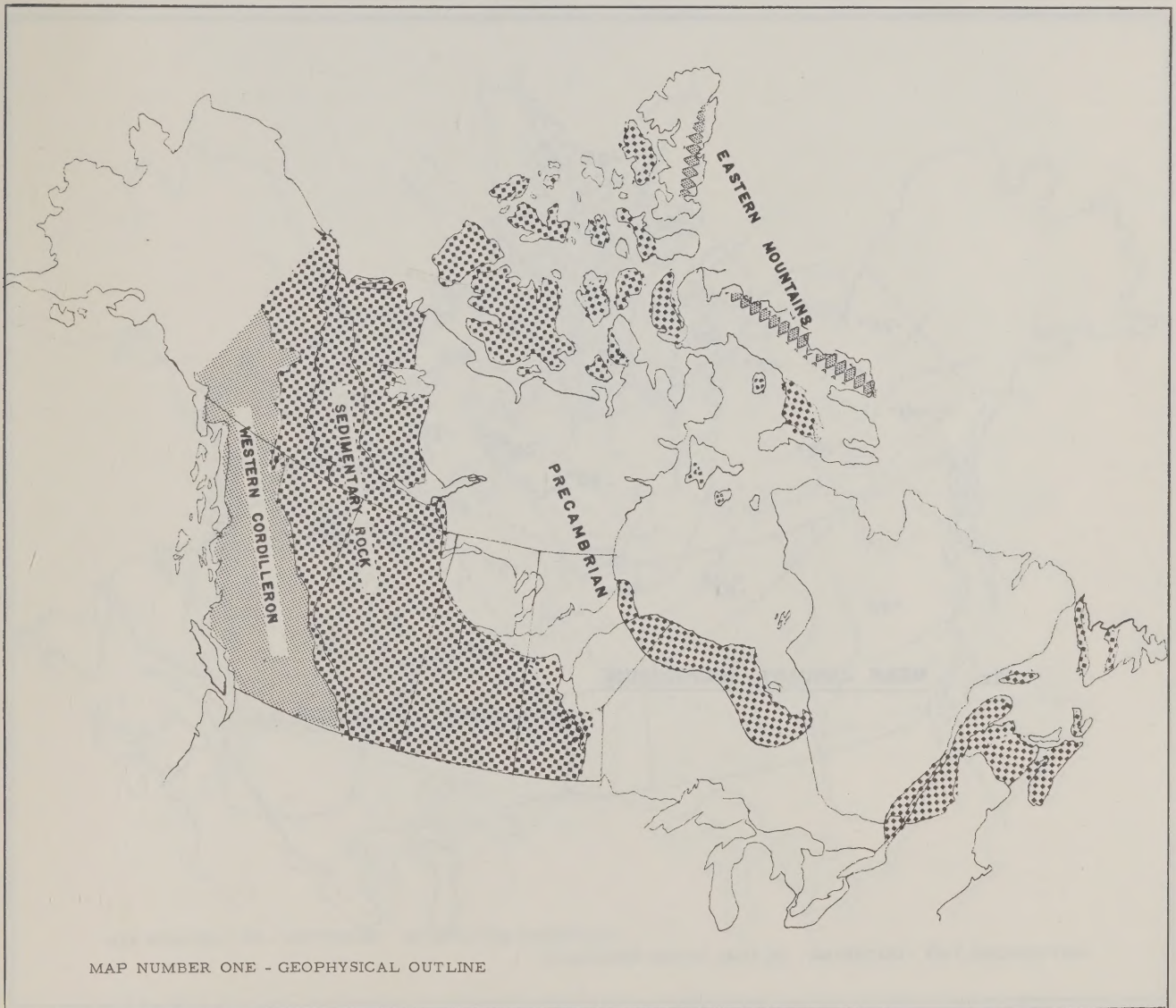
Because of the prohibitive cost of bulk transportation, little attention has been paid to deposits of base metals in the North, except where they are of

particularly high grade and are located close to navigable water. Even here the operation involves stockpiling concentrated ore from one shipping season to another...a risky situation when prices fluctuate, unless the producer has an assured market.

Gold, therefore, remains the favorite target of most prospectors, transportation of the product posing no problem. Of the 30 million ounces produced annually in the world 17 million come from South African fields where cheap Bantu labor is exploited to keep the operating costs low. Seven million ounces are mined in Canada and the remainder comes from several other countries.

Most of the South African mines are controlled in Britain and because of the current situation in South Africa, the operators are beginning to turn their attention to the Canadian North. They apparently feel that the stability of the political climate in this country will offset the reduced margin of profit caused by higher operating costs. One large syndicate has already begun an extensive exploration program in a very promising area.

To some extent the mining industry is self-perpetuating, the facilities developed to service one operation serving in turn to make new areas accessible to exploration and development. In addition, each new



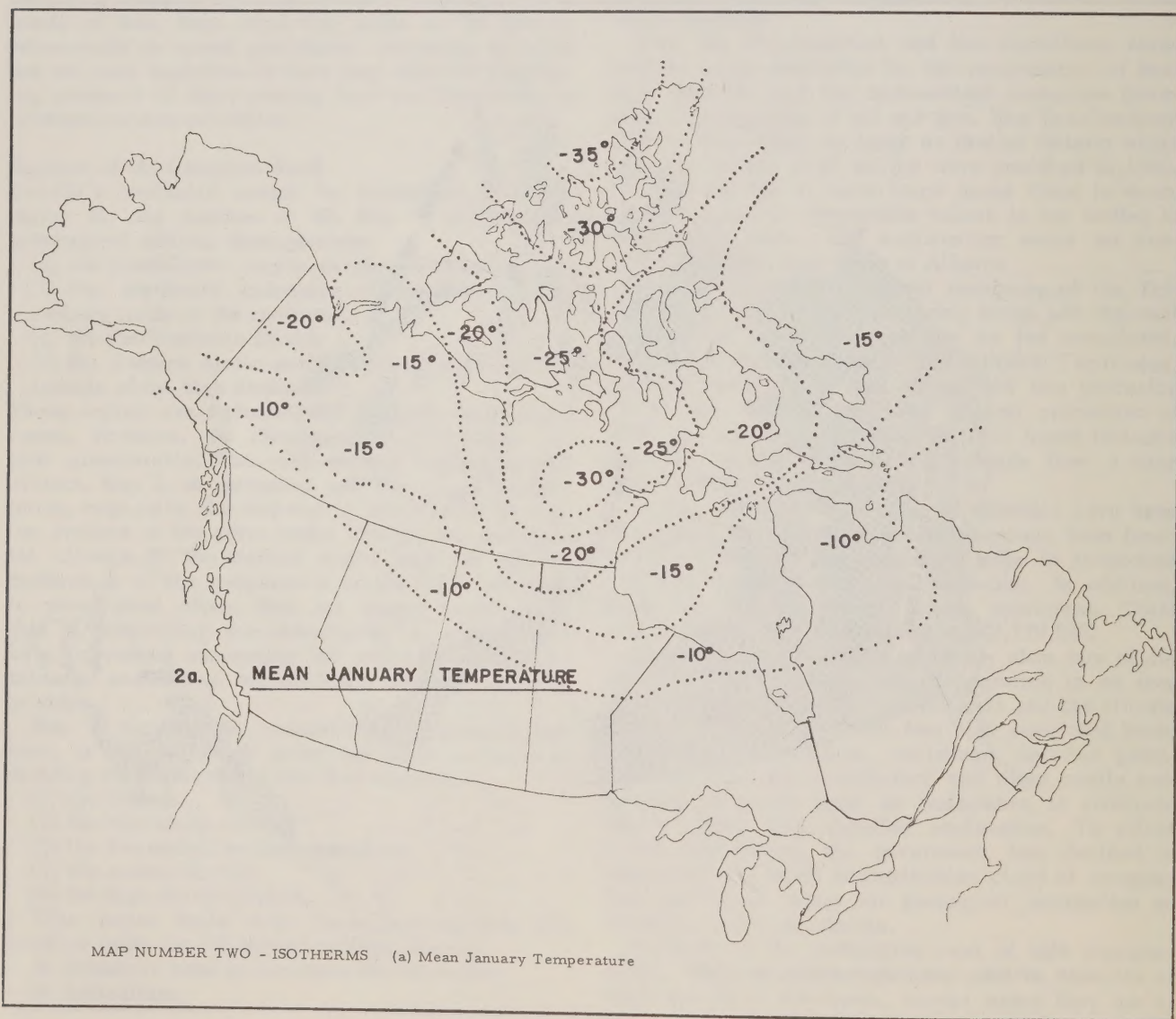
mine creates a pool of experienced local labor, men accustomed to regional climatic conditions and familiar with the local area. Techniques of construction, transportation and mining are also improving constantly and costs of operations should steadily decrease as the industry expands its activities.

While the current trend toward compactness (particularly in automobiles) has had serious repercussions in the steel industry in the United States, world consumption of base metals is continuing to rise in direct proportions to living standards. In the report of the Paley Commission it was suggested that the world demand for base metals would be more than doubled by 1980.

This trend will ultimately lead to full utilization of base metal deposits in the Canadian North. Once markets have been assured, and transportation problems solved, the lead-zinc deposit at Pine Point will be mined and the iron ore of Ungava put into production. Also, based on what we now know of the potential in the Territories, the accelerated exploration programs now commencing should most probably lead to other finds that will warrant large scale operations.

Oil and Gas

The sedimentary basins in the Western Provinces consist of an area 800 miles wide at the Interna-



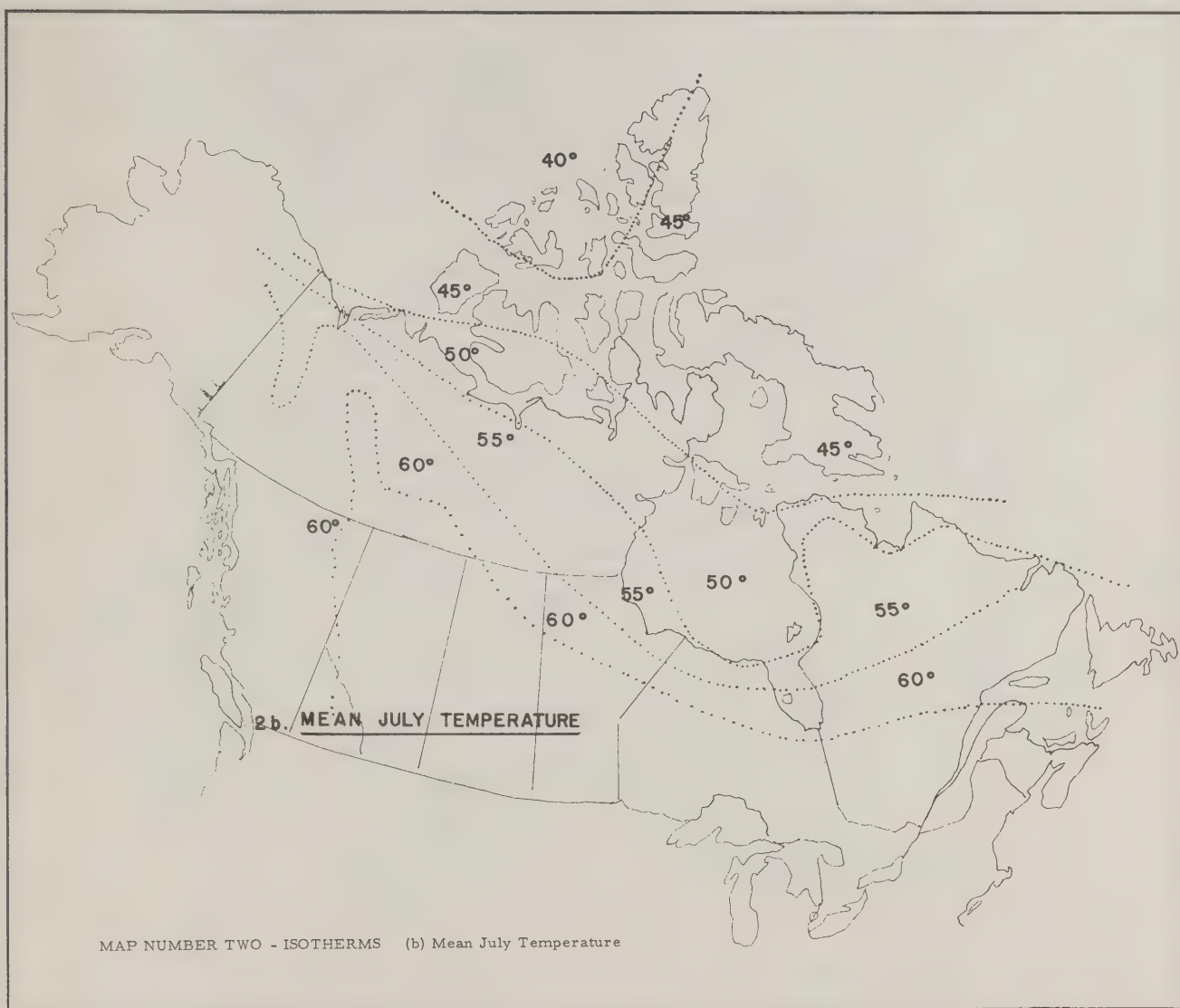
tional boundary between Canada and the United States, stretching from the Pre-Cambrian in Manitoba on the east to the granitic mountains on the west. Northward, this area extends 1,600 miles to the Mackenzie River Delta. On the Arctic coast its width is about 240 miles. The major portions of the Arctic Islands consist of three or four large sedimentary basins which may be seen on the accompanying maps.

In such a large relatively unexplored area, there are various ways in which an estimate of possible oil and gas reserves may be made. Perhaps the most satisfactory and reliable method is that of estimating the volume of sediments within the basins

and comparing this with other sedimentary basins in a more advanced state of development in other parts of the world.

In the United States a basic figure of 32,000 barrels of oil per cubic mile was originally used as a guide, but this has now been revised to 50,000 barrels per cubic mile while the California average is twice that figure. Gas discoveries average about six billion cubic feet per cubic mile, or 6.5 thousand cubic feet for each barrel of oil found.

In our areas, for purposes of computing the volume, only the area west of the 1,000 foot isopach was used and the thickest sedimentary section taken was



16,000 feet. Below that depth very few wells are productive from the older sediments.

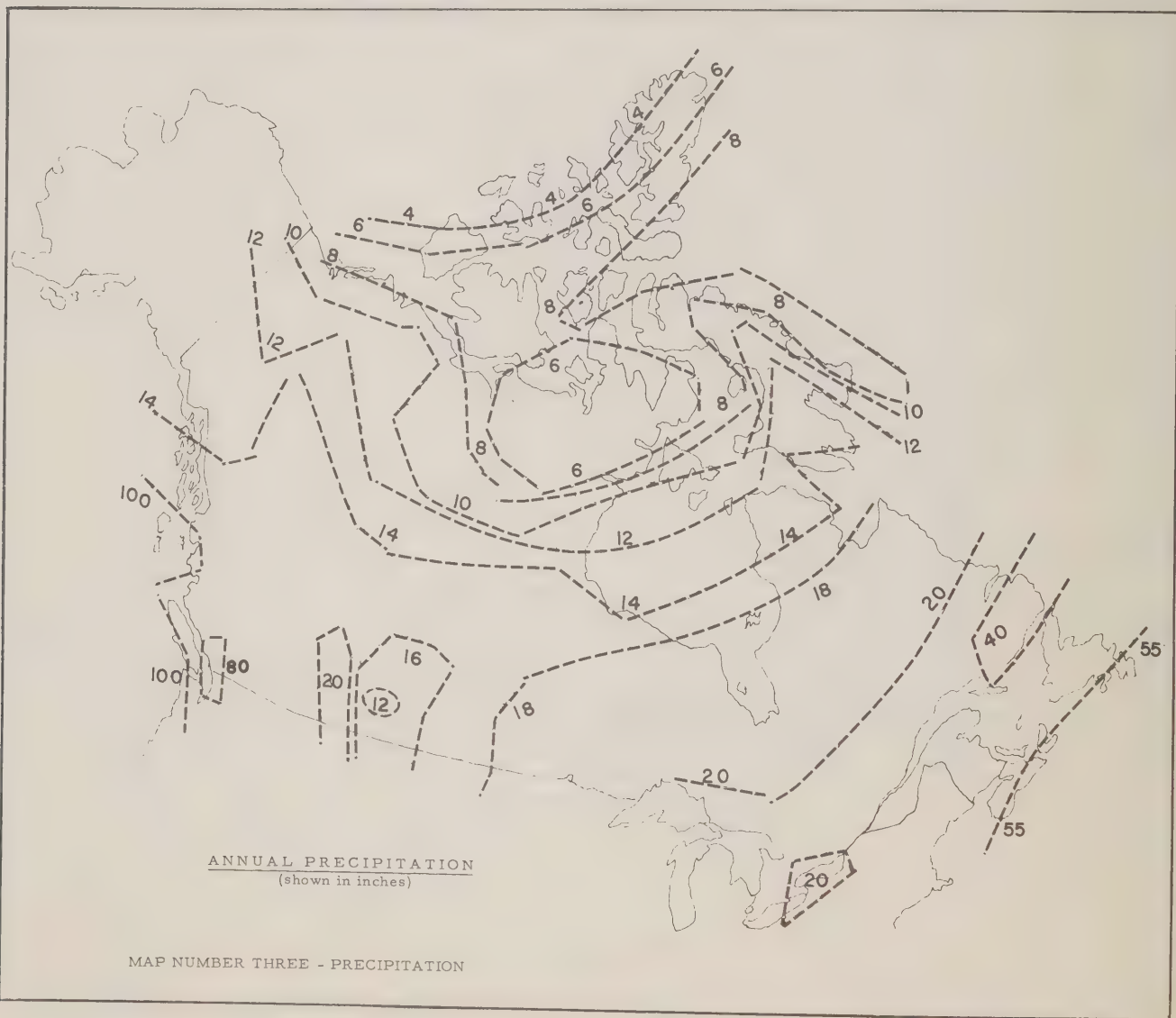
On this basis, the volume of sediments in the Northwest and Yukon Territories is about 332,000 cubic miles. Using a conservative estimate of 30,000 barrels per cubic mile, this would give an estimated reserve of 10 billion barrels of oil and 60 to 90 trillion cubic feet of gas.

Estimating the volume of reserves in the Arctic Islands is more difficult. The known area where sedimentary rock is present is about 350,000 square miles. Since measured and estimated sections are very meagre indeed, an approximation for the average thickness may be in the order of 10,000 feet.

Using the standards as before, a total expected reserve of 21 billion barrels of oil and 150 trillion cubic feet of gas should be realized.

The total estimated reserves (31 billion barrels of oil and from 210 to 240 trillion cubic feet of gas) are about seven times the present discovered reserves of oil and gas located in Western Canada. This gives some idea of the possible size and value of this resource.

Of course, mathematical projections look very nice on paper but one must bear in mind the many factors that will influence the development of this potential. First of all, climatic conditions impose a seasonal limit on much of the physical work involved. The



cost of seismic surveys runs to \$1,500 per square mile--three to four times the cost of similar work on the plains of Western Canada. Similarly, while survey costs with the gravimeter are about \$3 a square mile in the Western Provinces, they soar as high as \$150 a square mile in the Territories because of the inaccessibility of the terrain.

Such problems, of course, are not insurmountable and to date 117 million acres are under permit for exploration.

Assuming that we are able to find the oil and gas and produce it economically under these adverse climatic and geographic conditions, we are still faced with the number one problem of the North--

transportation--and the number one problem of the industry--available markets.

As far as the latter is concerned, a market will ultimately develop although the exact time and place cannot easily be foretold. And it would be very difficult, in the light of technological developments during the past decade, to believe that the transportation problems cannot be overcome by the use of underwater pipelines or even atomic powdered submarine tankers.

The foregoing data on prospects for valuable production from non-renewable resources have been given because they show the principal economic base for a northern population.



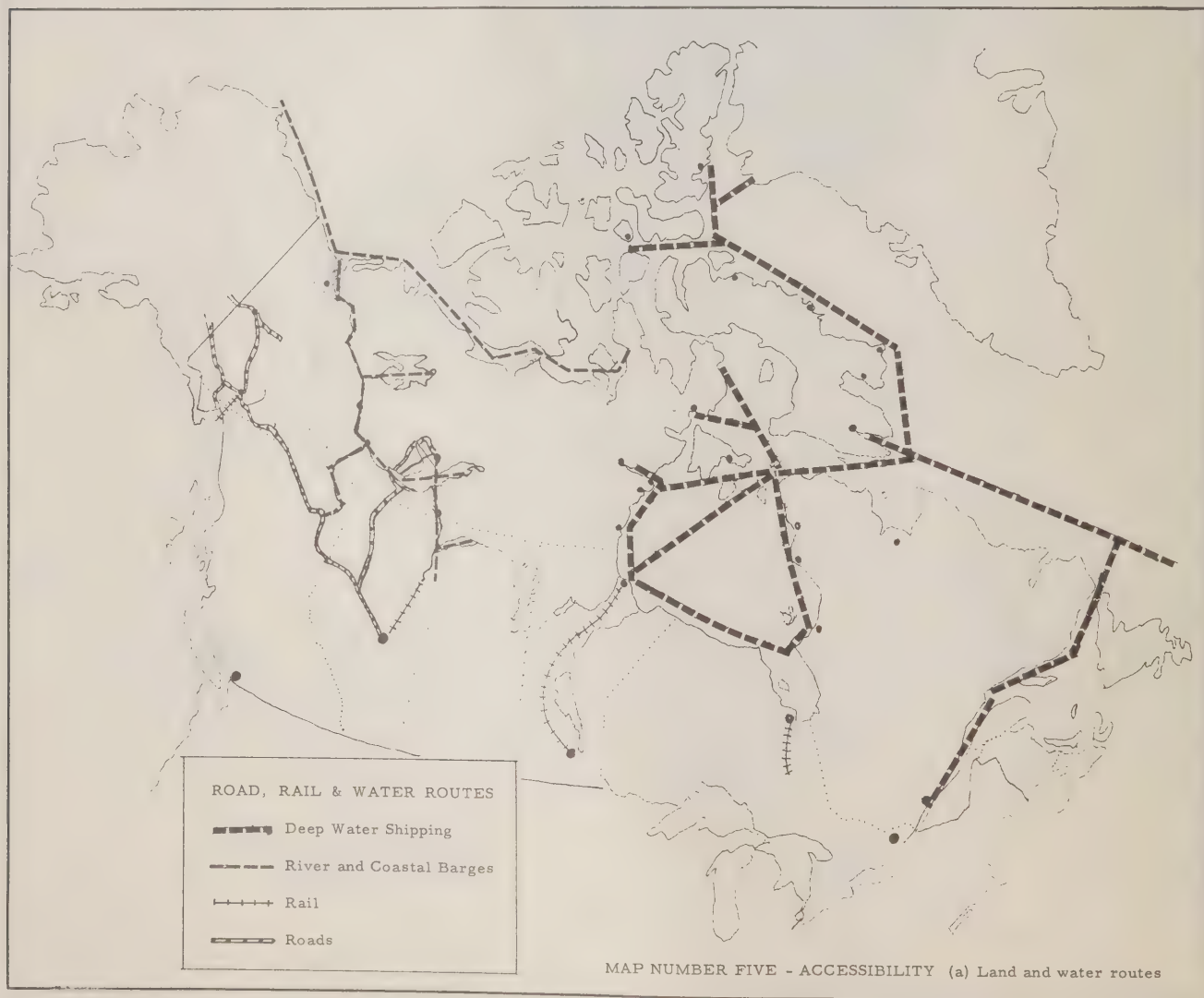
MAP NUMBER FOUR - ICE DISTRIBUTION IN AUGUST

Development of the oil and mineral resources of the Northwest Territories is essential if the standards of living of the indigenous people are to be raised above the present marginal level. Jobs would probably be created for as many as 10,000 persons if the estimated reserves of oil were located and put in production. It must be remembered, however, that the number of persons employed in this industry is on a lower ratio to capital invested than in any other major industry. Once in production, the oil fields require a minimum of maintenance and many operate largely by remote control.

The bulk of the persons employed will be engaged in administrative work in the south, in refineries and in product distribution. People employed in the field

will be engaged in pipeline maintenance and the operation of the oil fields. If the fields were developed to the fullest extent as many as 5,000 field workers might be required but it is perhaps more practical to assume that development will take place on an extended basis, with the field staff averaging between 1,000 to 3,000 at any given time. During the construction stage of course, much larger numbers of men will be required in the field.

In the field of mining, while automation is slowly forging ahead, there is no substitute for men both underground and on the surface. The industry currently provides jobs for some 800 persons in the N.W.T. and if the Pre-Cambrian area yields even 10 per cent of the minerals located in the similar geolo-



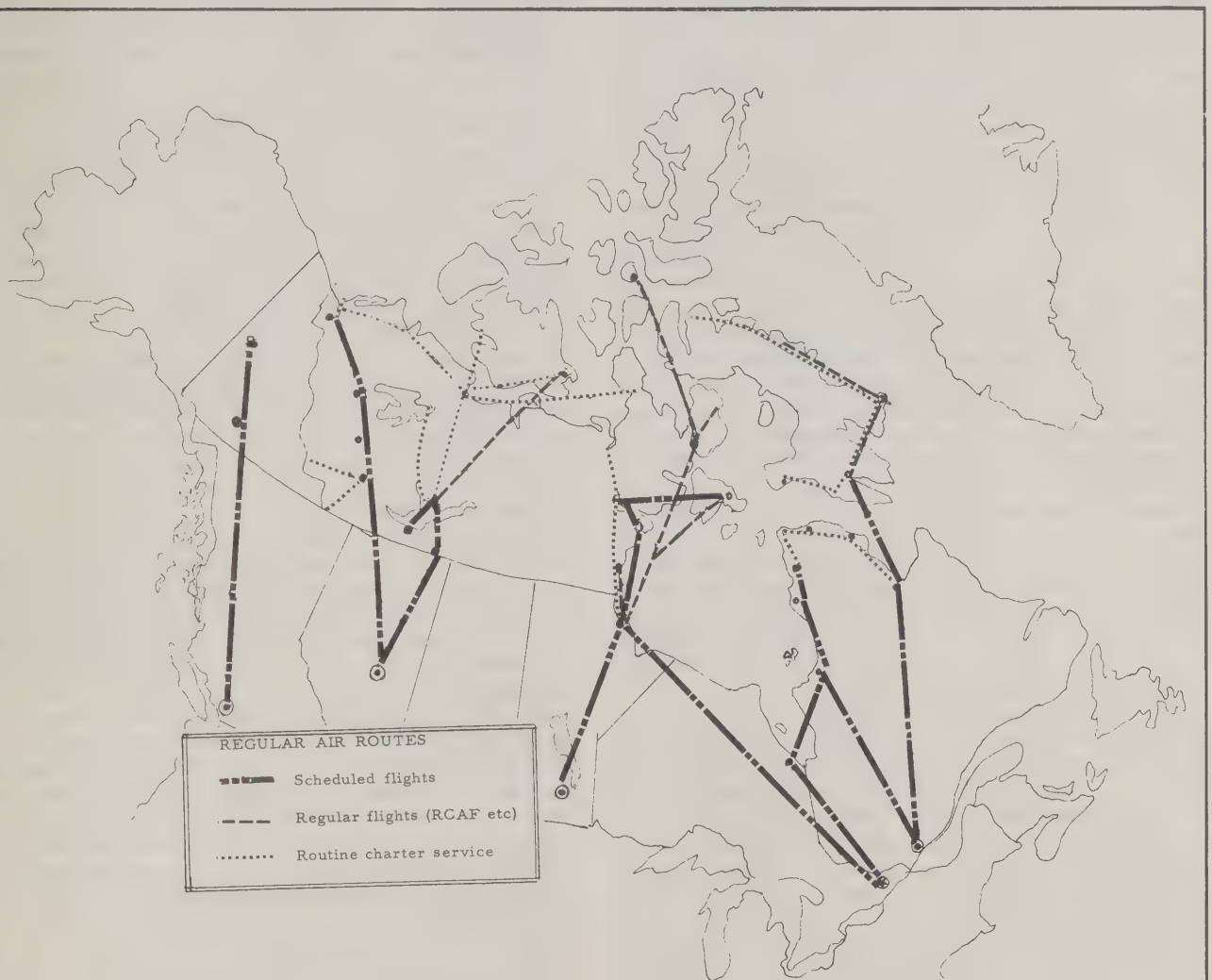
gical zone of Ontario, local jobs for close to 10,000 men would be created.

B--Agriculture

While agriculture will probably never contribute significantly to the over-all economy of the Yukon or Northwest Territories, it will always be an important aspect of future development. As the population of the Territories increases and the native residents become more sophisticated, the demand for fresh meat, eggs, milk and vegetables will grow. Just how important the small kitchen gardens and greenhouses

are to the permanent white residents is well known to anyone who has visited these regions.

Many areas in the southern part of the Yukon and throughout the Mackenzie basin have good agricultural soil suitable for farming. In the Yukon, there are 520,000 acres and in the Mackenzie 2,225,000 acres of arable land. Most of this is heavily wooded, however, and clearing it for farming is unquestionably an expensive proposition, well beyond the means of the average person who might be interested in farming in these areas, without government assistance.



MAP NUMBER FIVE - ACCESSIBILITY (b) Air routes

Known Areas with Arable Soil

	Acreage
Yukon: Desadeash-Takhini Valley	220,000
Liard River Terraces	17,000
Lake Teslin	20,000
Tagish and Little Atlin	8,000
Along the Yukon River	6,000
N.W.T. Slave River Lowlands	2,000,000
Hay River-Mackenzie Highway	17,000
Mackenzie River Basin	200,000

Studies carried out in these areas indicate that it is possible to produce, with a reasonable degree of success, such vegetables as potatoes, carrots, beets, peas, cabbage, turnips, cauliflower, radishes, lettuce and onions. Such cereal crops as oats, wheat and barley are grown as far north as Dawson in the Yukon and Fort Simpson in the Northwest Territories. Some cereals have even been ripened as far north as the Arctic Circle.

In some regions tender crops cannot be grown in open fields and the grower is forced to resort to hotbeds, cold frames, greenhouses and plastic shelters. These practices, coupled with available information on the use of fertilizers and hardy varieties, have made it possible to achieve considerable success in gardening.

Large scale farming operations are unlikely, but the Willoughby farm located 150 miles north of Whitehorse is an example of what we can expect to see throughout these areas as time goes on.

This farm is a two-man operation designed to produce fresh meat, eggs and vegetables for the local district. With the exception of some imported proteins which are added to the feed, the farm is completely self-supporting. A herd of 50 cattle is maintained along with a fair sized piggery and a large flock of chickens. In addition to supplying fresh beef, pork, poultry and eggs to their customers, the Willoughby's also produced eight tons of potatoes for sale last summer, as well as the necessary grain and hay to feed their stock.

While no large scale greenhouses are in commercial operation in the Territories, many individual residents have their own and some of the mining companies are considering attaching small greenhouses to the houses provided for their employees. At the United Keno Mines where coal is plentiful, a large greenhouse produces fresh salad vegetables for the mining community. Similar projects are quite feasible in other locations as well.

In the Keewatin district, the Eastern Arctic and the High Arctic, the complete lack of arable land and the presence of permafrost preclude any possibility of growing outdoor crops, with the possible exception of wild rice. Small private hothouses do

exist, however, and fresh vegetables have been grown as far north as Pond Inlet during the summer season.

It is doubtful if any commercial production will be possible in these areas unless the vastly improved techniques of hydroponics, which have been so successfully developed in Japan and Israel, are introduced to the Canadian Arctic.

Hydroponic gardening has long been a contentious subject but in recent years immense progress has been made. The hydroponic farms in Japan produced the full requirements of fresh vegetables for the entire 8th Army during the Korean war; this is no small task, with 200,000 mouths to feed. In land-poor Israel where a virtual desert is being turned into gardens through irrigation at tremendous cost, hydroponics have been introduced to increase the production of much needed foodstuffs with remarkable success.

The long hours of sunlight during the brief Arctic summer would permit fast production of many types of vegetables on a commercial basis if the hydroponic method were adopted and, by using artificial sunlight, production could be maintained throughout the winter as well. If energy in abundance is available from petroleum or nuclear sources in the High North, there are real possibilities in agriculture along appropriate lines under roofs.

Thus, while it is unlikely that agriculture will ever become a major industry in the northern regions, it is a resource which has hardly been touched to date and which is worthy of an intensive development program in the future.

C--Forest Potential

While the timber resources of the Yukon and the Mackenzie will not support a major industry there are, nonetheless, valuable quantities in some places for local needs. This area forms part of the Boreal Forest Region, the principal species being white and black spruce, some balsam, alpine fir and lodgepole pine.

Of the 110,000 square miles of Yukon territory lying south of latitude 65°, about 15 per cent is usable forest. An additional 35 per cent of this area is unproductive forest or scrub, while the remainder consists of tundra, water or barren. Surveys indicate that this area could sustain an annual cut of up to 100 million board feet. Even the most conservative estimate based on the relatively slow rate of replacement sets the figure at 50 million board feet per annum.

During the famed Klondike days sizeable stands of timber were cut for construction purposes and to satisfy the voracious appetites of the river boats, and the areas cleared became the farmland of the

Yukon. Today, about 4.5 million board feet are cut each year while an estimated 1,500 cords are used for firewood. About a million linear feet of round timber are also used.

While the timber resources of the Yukon could undoubtedly be better utilized--with much needed agricultural land made available as a result--the widespread use of British Columbia plywood as opposed to planking in construction holds this development in check. Also there is the problem of accessibility to markets, a problem which will undoubtedly be solved as development roads are built.

At any rate, there is adequate local timber in the southern portion of the Yukon to meet the needs of most foreseeable developments.

Similarly, good stands of merchantable timber are found along the Slave and Liard Rivers in the Mackenzie district and, although the trees are not excessively large throughout the Mackenzie basin, they are important for the local economy. Successful logging operations have been carried out as far north as the Mackenzie Delta area and small sawmills operate throughout the length of the river.

The growth factor in this area being greater than in the Yukon, better use is being made of local timber. Annual production has reached 15 million board feet with about 2,000 cords being cut for fuel each year.

The value of the forest in the Yukon and the Mackenzie does not stop with its use in the construction field nor as a source of fuel. Even the poorest grade stands of timber are vital to the survival of the fur-bearing animals and game in these regions. In this respect and in view of the great potential of the North as an area for the continent's sportsmen, strict conservation is essential. But even taking these points into consideration, timber is sufficiently plentiful to play an important role in developing the other resources of the North.

D--Recreational Potential

Until very recent years, tourist travel in the Canadian North was limited to a scant handful of adventurous travellers and such facilities as did exist were established solely for the accommodation of persons traveling on business or for temporary residents of the community. Before 1959, for example, there were only two tourist camps or outfitters in the Northwest Territories, but nine new ones have been established since that time to serve the growing tourist trade. In the Yukon, where tourism was stimulated much earlier by the opening of the Alaska Highway, there are 17 registered outfitters at the present time. One thousand tourists visited the Northwest Territories in 1960 and their expenditures have been estimated at \$450,000. During the same period over 20,000 tourists visited

the Yukon. Their expenditures were estimated at close to \$4 million.

The future of the industry will depend on a number of factors, but the outlook is generally encouraging and a rapid development is expected. In all probability tourism will ultimately rank second among the major industries in the North.

Travel and outdoor recreation activities throughout North America have experienced a marked growth during the past 15 years, due primarily to improved transportation facilities, higher personal incomes and increased leisure time. Americans and Canadians alike have developed an increased awareness of the North since Alaska attained statehood and since the Canadian Government accelerated its northern development program.

Sportsmen from both countries are continually looking for new sources of fish and game as southern areas become more crowded and the lakes approach depletion. When one considers that some 25 million American men and 2.5 million Canadians are either hunters or anglers, it is not difficult to understand why tourism in the North is on the increase. By current population projections this figure will rise to 44½ million by 1980.

The tourist appeal of the North has many facets, most of which are related to the natural resources. There is excellent angling in countless virgin lakes for a wide and interesting variety of fish, a wide range of big game unequalled elsewhere on the continent, sea mammals which could offer an interesting experience to the hunter, magnificent waterways for the boating enthusiast, a fascinating variety of flora and fauna for the naturalist and breathtaking scenery and picturesque northern residents for the casual traveller.

Nor are the tourist attractions restricted to the Yukon and the Mackenzie. Even the *Barren Lands* of Keewatin and the granite splendor of Baffin Island have much to offer. A small start has been made to attract tourists to those areas.

The greatest single drawback, of course, is transportation. It is axiomatic today that wherever roads are opened, tourism will follow, and while every area welcomes the affluent tourist who travels by private plane, it is the little man who packs his brood in the family car and travels on a relatively low budget that accounts for the major portion of the industry's revenue in the long run.

The new development program being implemented by the Department of Northern Affairs caters to both classes of tourists. Facilities for docking boats and aircraft are being improved in many areas where fish and game are plentiful. A training program will ensure that licensed guides and outfitters are not only capable of doing their job properly, but that they are

fully aware of the importance of resources management.

Roadside campgrounds are being provided along the Highway systems and these will do much to attract the low-budget traveler. Picnic grounds are also being created and selected areas of attractive shore line are being reserved for recreational use.

Close co-ordination is being maintained between the government officers responsible for tourist development and the *Roads to Resources* program. Emergency airstrips are being constructed at all major communities.

The game laws are being reviewed to permit the controlled hunting of some of the animals heretofore reserved exclusively for use as food by the native members of the population. Buffalo may now be hunted and, in certain areas, seal as well. As more and more residents become less dependent on game for their livelihood, additional species will be added. Since the sports hunter is usually interested only in the trophy and not in the meat, there is little reason why a tourist could not be allowed to make the actual kill. He can then turn the carcass over to the Indian or Eskimo guide who is normally allowed to shoot without restriction, but who can realize many times the value of the meat by selling his skilled services and renting his dog team to the hunters and cameramen.

This would permit the hunting of walrus and other sea mammals in the wide list of attractions that will bring tourists and their money into the many depressed areas in the Eastern Arctic. In this way, the recreational use of the wildlife of the North can bring much greater economic benefit to residents than is now derived from domestic or subsistence use. This revised system of utilizing wildlife can be an effective conservation technique. By the same token, the wildlife and fisheries resources of the Territories would also make a greater contribution to the Canadian people as a whole, through the opportunities they would provide for broadened recreational horizons.

The Battelle Report, which was prepared for the Alaska and U.S. Highway Commission, has recently outlined a road building program which would be a joint Canadian-U.S. undertaking aimed at opening Alaska for greater development. If this program is implemented, the authors of the report estimate that by 1980 annual visitors to Alaska will number 850,000. They estimate 550,000 will visit Northern Canada each year.

The area covered by the report includes Alaska, the Yukon Territory, the Mackenzie District from Aklavik to Fort Smith and the northern third of the adjacent Western Provinces. While a portion of the 550,000 estimated tourists to northern Canada may

confine themselves to the recreation areas in the northern parts of the provinces, a good fraction would undoubtedly explore the facilities of the Yukon and the Mackenzie District. At the same time, many persons who are Alaska bound will engage in side trips to points of interest in the Canadian areas. This forecast, of course, is predicated on the completion of the suggested network of roads.

The Battelle report strengthens the rather conservative estimate of 50,000 annual visitors to the Mackenzie by the year 1980 which has been forecast by the Tourist Development Section of the Department of Northern Affairs. This alone would mean an annual expenditure of \$15 million in an area where the combined commercial fishing and fur industries have averaged less than \$2 million annually in recent years.

While we sometimes tend to think laterally (i.e. from West to East) in respect to the Territories, the geographical configuration runs north and south, as will the communication routes and hence tourism. For this reason close co-operation and co-ordination is essential between planners for the Territories and the authorities of the provinces through which these access routes will come. One might feel that Territorial facilities will compete with those of the provinces, but experience in the tourist industry indicates that the two should be mutually beneficial.

Just as tourism is one of the major industries in Southern Canada today, there is every reason to believe that it will be a major industry in Northern Canada tomorrow.

E--Fish and Game

Before the era of the white man, the Indians and Eskimos led a nomadic existence based on a hunting and fishing economy. The Indians occupied the area south of the treeline while the Eskimos lived along the seacoast with the exception of the inland group in the interior of Keewatin. The Indians and Eskimos seldom met except in strife, although the former frequently made trips into the barrens during the summer and fall, to hunt caribou and muskoxen.

While the population undoubtedly reflected cyclic changes in the quantity of game available, hunting methods were rudimentary and a relatively even balance prevailed. It was not until the arrival of the whalers in the latter half of the 18th century that firearms were introduced. The whalers traded with the Eskimos for fresh meat and furs and occasionally employed them as guides and helpers.

With the means of mass slaughter in their hands and an additional demand for meat, the Eskimos in the Mackenzie Delta quickly decimated the caribou herds in those areas. About 1780, traders of the North West Company began to move into the Mackenzie

district and they were soon followed by the Hudson's Bay Company's men. Animals previously considered almost worthless took on a new value as Fur became more precious than meat. This had a considerable effect on the normal balance of nature.

The Fur Industry

Thus trapping became the way of life of the majority of the people. Wildlife was still reasonably plentiful, harvesting techniques were improving and no one was particularly concerned with conservation. With the growth of the fur trade white trappers began to move north, first into the Mackenzie and then into the barrens. Their numbers reached a peak during the 1930's but dropped off in the late '40's when the price of white fox dropped steeply.

Results of the 1956 Census indicated that some 65 per cent of the population of the Northwest Territories depended on fish and game for their livelihood. In 1958, a total of 2,647 general hunting licences were issued in the Northwest Territories, including 327 to white trappers or persons of mixed blood, 1,211 to Indians and 1,109 to Eskimos. In the post-war years, the total catch has fluctuated from a high of 922,000 pelts in 1948-49 to a low of 236,000 pelts in 1958-59. The value of production has varied from \$2 million in 1950-51 to \$757,000 in 1953-54.

The principal furs are: white fox, muskrat, mink, beaver and marten (in order of dollar value). Muskrats are the staple catch in the Mackenzie River delta and throughout the other western districts, while white fox are caught chiefly by the Eskimos in the Arctic.

Game (Subsistence Value)

In the Northwest Territories there are only two terrestrial big game species of importance to the economy; the caribou and moose. The number of caribou killed in the years from 1932 to the present time has decreased tremendously. This is partly due to the fact that some of the Indians and Eskimos have left their former hunting grounds, partly because of a change in the migratory habits of the animals but mostly because of an alarming decrease in the size of the herds.

By contrast, the annual number of moose taken is increasing as is the size of the herds. To a gratifying degree this is the result of better forest fire prevention and general practices of conservation. It has been estimated that the subsistence value of fish and game taken in the Northwest Territories, runs to about \$2 million annually. Certainly, it would cost more than that to replace it with imported food.

Commercial Fishing

Commercial fishing for export is carried out in the Great Slave Lake region, Lakes Claire in Wood Buffalo Park, Hudson Bay, Frobisher and Ungava Bays in the Eastern Arctic. During the period from 1950 to 1955, the value of fish taken commercially averaged in excess of \$2 million annually. This has dropped off considerably in more recent years, the total value in 1958-59 being just over \$700,000. This is partially due to certain species decreasing in numbers primarily because of bad ice conditions in the lakes. However, new areas are beginning to produce and the annual volume should increase. The commercial char industry in the Eastern Arctic has enjoyed marked success in the luxury markets of the South and to date neither the market nor the resources have been tapped to the full.

While the fish and game of the North are inadequate to support the growing population as it did in the past, they nevertheless play a vital role in the economy of the country. Past harvesting methods have proved wasteful and there has been much wastage of good food through inadequate storage facilities. Special efforts are being made to rectify these faults at the present time and there is no reason to believe that the value of this important resource will not increase greatly in the future, keeping abreast of the general development of the Canadian North.

F--Small Industries in the North

While the exploitation of the non-renewable resources in the Canadian North will ultimately ensure adequate employment for the present population as well as for workers from other sections of the country, there is a great need for small industries that will add some modicum of cash income to those families--primarily among those Eskimos and Indians--who cannot readily be absorbed into industrial life.

Many of the older people, uneducated and prematurely aged as a result of their rigorous years in a hostile land, would find this transition impossible. In normal circumstances, they would become increasingly dependent on the younger men who were following in their footsteps as hunters and trappers. Since it is this new generation that will begin the break with tradition and move from the land to industry, the older people must find ways of earning money to supplement what they can glean from the land.

The maximum use must be made of all existing resources, including the most valuable resource of all--the skills of the people themselves. Much has been accomplished in this respect in various communities, particularly throughout the Eastern Arctic. The government has embarked on a program of area surveys aimed at assessing the resources now in evidence. These first-hand field studies cover fish,

timber, wildlife as well as mineral and agricultural potentials. Also observed in detail are the living habits and techniques of the people.

Once the research data have been assembled, ways and means are recommended to improve the economic lot of the indigenous people. In areas where resources are scant, this may involve the suggestion of relocation. In others there may be excellent scope for self-help projects which reflect the initiative and abilities of the people themselves.

All such ventures give strict adherence to principles of forest, fish, game and soil conservation, for these are developments which must be of a continuing nature.

When the study has been completed (and this normally requires at least a year), a team of experts goes into the area to live with the people and to give them suggestions and assistance in embarking on new projects. While the Federal government will provide loans and technical assistance during the formative years, this help is ultimately withdrawn and the people and the projects must stand on their own feet economically.

This is in line with similar technical assistance programs developed under the United Nations and the Colombo plan. As in underdeveloped regions elsewhere, the people being helped have but limited horizons, scant education and techniques which often predate neolithic times. They are ill-equipped, even with a limited population, to glean more than a bare subsistence from the land and sea.

It is not the intention of the government to subsidize uneconomic areas or activities, but in facing a change from palaeolithic to contemporary modes, a considerable social investment is required as well as a liberal view of the need for immediate profit. Even reductions in relief expenditures constitute a solid social and economic gain.

Three main area surveys have taken place--on the east coast of Ungava Bay, in the Mackenzie Delta and on the east coast of Hudson's Bay. Some work has also been carried out in the Keewatin area. In these places relief costs have been very high while public health and morale have been correspondingly low.

Among the projects already undertaken, several serve as examples of what can be accomplished in this respect. The Eskimos at Cape Dorset, under the guidance of a highly skilled Government officer, have established a producing Co-operative which now markets stone prints and other art work. As a side line they also operate a small tourist camp. Their products, eagerly sought after in art centres across the continent, netted \$22,000 last year. In a community of some 330 persons, this goes a long way to

augmenting the traditional income from the land and sea. Sales this year should exceed \$60,000.

It is particularly interesting to note that this operation has become so self-supporting that the Eskimos themselves recently hired a white artist from southern Canada to act as manager and supervisor.

Another project was started at George River on Ungava Bay. In the first year relief costs dropped from \$14,000 to practically nothing; the Eskimos grossed \$18,000 from a commercial char fishery serving southern markets, started a logging operation, built themselves a community hall and established their own co-operative.

A continuing program of area surveys has been planned for several years to come and other projects have been planned and will commence with this year's shipping season.

One difficulty facing the government in this respect is the fickleness of the land itself. In any community where dependence for survival lies with the fish, the game and fur bearing animals, this year's feast may lead to next year's famine. In addition, the sudden shutdown of a mining operation may result in the need for an abrupt relocation of several hundred persons who have been directly or indirectly dependent on it for their livelihood. Thus, an ordered progression of surveys must often give way to a diversion of effort and, under the pressure of the emergency, the results may be of a temporary rather than of a permanent nature.

When new industries are established or encouraged, every attempt is made to base them on such resources as do exist within the area, although in some cases it may be necessary to import some of the materials for processing. Considerable use is now being made of sealskin, once used primarily for clothing, footwear and for whips and traces for the hunter. Skins are now tanned to make the products acceptable on southern markets rather than scraped in the traditional Eskimo way. These are fashioned into hats, jackets, mitts, toys, rugs and other products and an enthusiastic market has been established in the South.

For years the Eskimos and Indians lived on a barter system. Cash was quite foreign to them and their economic life was supervised--quite practically, as a rule--by the local trader. Since these self-help projects are primarily of a community nature, the Eskimos have been encouraged to form their own Co-operatives and special legislation was passed two years ago to make this possible in the Northwest Territories.

The one basic rule followed in all these developments is that the people themselves are made to feel that they are running their own show and, while

technical assistance is available to them through the expert assigned to their project, all decisions rest with them. Group discussions are regular features of every project and strong emphasis is placed on the need for the group to work together in order to make the maximum use of the resources within their reach. Another point that is stressed continually is the need for an intelligent approach to the harvesting of resources--for, without conservation, the projects cannot survive.

When the time is ripe, the group may apply to the government for a loan from a special fund set aside for their assistance. Close supervision is maintained by specialists provided by the Department of Northern Affairs. Not only must this supervisor organize a successful operation and train the people in their tasks, whether it be a fishing, logging or milling operation or the production of handicrafts, but he must also train his own replacement.

Gradually supervision is transferred from the specialist to the member of the group best suited to assume this role. Naturally this is a slow process and one of considerable delicacy. Completed too quickly, the entire project may collapse. Completed too slowly, the required interest and sense of responsibility being engendered may be stifled.

While on the surface it may seem presumptuous of the white man to attempt to show the Eskimo or Indian how to improve his techniques in harvesting resources, this type of assistance usually takes the form of introducing new types of equipment. The hunting of seal and whale, for example, has been improved considerably by the use of nylon nets. During seasons of open water these nets replace the system of shooting and harpooning with the result that far more food can be taken with far less effort.

This system of harvesting also greatly reduces wastage of animals which are wounded but escape or sink before they can be landed.

Considerable progress has been made in the establishment of industries which make better use of existing resources. It is also likely that, in years to come, small cottage industries may be established for the processing of imported materials for sale locally and for export. The basic skills of the people have been proved and, while in many cases the regimentation of the industrial life is alien to their nature, they are thoroughly capable of sustained production when allowed to set their own pace.

Thus we may ultimately see the day when small manufacturing operations exist in the Canadian North turning out a wide variety of products which will reflect the skill of the indigenous people.

C--Northern Residents--The Human Factor

The Canadian North is one of the most underpopu-

lated areas in the world and the conditions that make it so have molded the characteristics of its people. The two major factors of course are the extreme climatic conditions which prevail, and the varying degrees of isolation under which the people live. Using the 493,225 square mile area of the Mackenzie district as an example, its population of 14,400 would be a less than capacity crowd for Toronto's Maple Leaf Gardens which covers one city block, or approximately 1/100th of a square mile.

In the Yukon, an area which has developed much faster than its neighboring Territory, there is one person for every 14.6 square miles of land. In the Mackenzie there is 35.2 square miles per person while in the Arctic area above the tree line the per-capita area is 76 square miles.

The largest fraction of the population are white people including persons of mixed blood and, for the most part, they live in the settlements which have sprung up around mining developments, administrative centres, or which have developed with a trading post, school or mission as a focal point.

The Indian population is found as far north as the treeline. Many are permanent residents of specific settlements but travel extensively throughout the bush country in search of the fish, game and fur which have been the traditional backbone of their economy. In recent years improved education has made it possible for many of them to find wage employment, primarily in construction work, although some have also been employed in mining, which is the main industry of the North.

Above the tree line, the population is predominantly Eskimo. These hardy and adaptable people have for centuries wrested a meagre subsistence from an area where few others could survive. They too have entered a period of transition. While the past dictates of survival forced them to live a scattered and nomadic life which was directly proportionate to the amount of game over a given area, they too are beginning to come together in communities which offer education, security from starvation and disease, and where their incomes from trapping can be augmented by wage employment in varying degrees.

On the whole, living conditions for the indigenous population can at best be classified as marginal and without government assistance many could not survive during those cyclic years when game and fur are scarce. At the same time, the introduction of a cash economy and a greater degree of economic self-determination have resulted in a demand for more than just the basic staples. Whereas the hard-headed trader of the past would only sell those items which were essential to the survival of the man, a changing way of life and improved living standards have

altered the pattern to a degree where a reasonable cash income is essential.

Many have entered wage employment during the past five years and have begun to live in houses in settlements with the white man as their neighbor. While work discipline is entirely alien to the elders (a frustrating fact which their employers have had to live with) the younger generation, educated to some extent and familiar with the ways of the white man, is sound potential material for wage employment in the future. In certain circumstances, employers have found that carrying a *swing shift* of workers has been one solution to the problem of absenteeism. Not only has this meant a better distribution of jobs--with wages reduced accordingly--but each person then has time for the pursuit of the traditional subsistence hunting and fishing which, in effect, makes up for the lower earnings.

Looking at the broad picture of employment and using the population of the Northwest Territories as an example, the present potential labor force can be considered to include 8,500 men between the ages of 16 and 55. About 4,200 of these are currently in regular wage employment (2,200 being employed directly by the government).

The remainder either live entirely off the land or live on subsistence hunting, fishing and trapping with casual or seasonal wage employment. Employment generally (exclusive of government employment) is largely seasonal -- except in the mining industry, and even there the payrolls are considerably reduced during those months when outdoor work is curtailed or restricted by weather conditions.

The majority of jobs which pay a *reasonable* income and permit a standard of living considered adequate by the southern yardstick, are held by whites who have moved into the Territories on the basis of their educational qualifications or previous experience. The plain hard facts of the case are not that the indigenous people do not want this work, but that they lack the education and the experience needed to compete with the outsider when such jobs are available.

The government's educational policy, is to a large extent, aimed at closing this gap. Vocational training centres have been opened in the North and selected candidates from all across the Territories have been enrolled in technical courses in the South to qualify them for specific jobs. In addition, the government has been extremely active in carrying out studies of existing resources within the North and in helping with the formation of small local industries which befit the talents of the people and the materials on hand.

Of the 4,000 odd men in the potential labor force who are not currently engaged in regular wage em-

ployment, we might estimate that 1,000 enjoy a *reasonable* standard of living from the resources of the land. This leaves a backlog of 3,000 who, with their families, lead a marginal or sub-marginal existence and at the rate of present programs, it will be some years before this figure is reduced to zero.

The fact also remains that this potential labor force is growing rapidly and, if the rate of population growth of the past decade continues for the next ten years, jobs will be required for a total of 14,500 men by 1971.

Granted, as the educational program develops, more and more of the indigenous population will be capable of competing with outsiders for jobs which exist now and which will be created in the wake of new developments throughout the North. The rate of immigration will probably drop off, but we will still be faced with an additional 3,000 to 4,000 *home-grown* members in the labor force in ten years time.

Many of the older generation will never be able to fit into the structure of wage employment, nor do they wish to do so. Consequently, with the known resources of the land already taxed to the utmost by the present population, it is essential that the efforts to create small local industries and to develop more efficient methods of harvesting renewable resources, be accelerated. If the rate of growth from 1951-1961 continues, the population of the Northwest Territories will reach about 38,000 by 1971. This assumes the same pace of immigration as in the past, but the fact remains, the annual natural increase of the population is rapidly approaching the rate of 1,000 a year.

In the past decade, significant steps have been achieved in the related fields of health and welfare. Tuberculosis, once the number one killer in the Canadian North, has been brought in check, deaths per thousand population dropping from 5.2 in 1950 to 0.7 in 1959. Another tragedy of the North--the high rate of infant mortality--is also being effectively checked. While statistics fail to show a similarly happy trend (the rate was 158 deaths per thousand live births in 1950 and 134 in 1959), it must be understood that until 1956 many infant deaths, particularly neo-natal ones, went unreported. Improved housing conditions and better medical facilities now made possible by the creation of more centralized communities and additional government field services, have been largely responsible for these trends and there is every reason to believe that the permanent residents of the North can look forward to longer and healthier lives in the future.

This, of course, will contribute greatly to the continuing growth of the population.

Thus, at least numerically speaking, there will be an adequate labor force available for the develop-

ment of the resources of the North in years to come. This points directly to the need for an educational program which will enable these people to compete for work wherever it exists in Canada, a program which will also enable the families of employable males to adjust smoothly to such a pattern.

Based on past performance, the native born men of the North have demonstrated that with training and enlightened supervision, they are capable of undertaking the basic jobs required in developing this forbidding country.

Population of the Canadian North

District	Area in Square miles	Estimated Population	Square miles per capita
Yukon Territory	205,346	14,300	14.6
Northwest Territories	1,253,438	23,900	52.2
Mackenzie	493,225	14,400	35.2
Keewatin and Franklin	760,213	9,900	10.0

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